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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

OFFICE OF MYCOLOGY AND DISEASE SURVEY

Vol. XIV March 15, 1930 Number 6

WINTER INJURY TO PEACH AND APPLE TREES

In the Plant Disease Reporter for February 1, 1930 (14: 24-27), attention was called to extensive damage to peaches in Middle Western States from exceptionally low temperatures. Dr. M. B. Waite suggested that plant pathologists should obtain more exact facts with regard to the amount and extent of damage. He also outlined the methods to be followed in making examinations of buds and trees to determine the extent of injury.

Since February 1 several letters and reports have been received giving further details and the more important of these are quoted in this issue. It will be noted that the losses, not only of buds but also of trees and in some cases entire plantings, will be very heavy, and there are indications in some of the later reports that the damage may not prove as great as is now expected. There is also the suggestion that perhaps all of this trouble was not caused by the freeze of January 18, but that some of it might have occurred during freezes of November 30 and December 3, 1929.

We are fortunate to be able to include in this issue four photographs showing this injury, one by Leslie Pierce and three by John C. Dunegan.

WINTER INJURY TO PEACHES IN INDIANA

Various reports of Leslie Pierce, Office of Horticultural Crops and Diseases, located at Vincennes, Indiana, to John W. Roberts.

February 6

"I have examined trees in all parts of five peach orchards near Vincennes and in five orchards in the Decker section. We have found in all of the orchards examined that 75 per cent to 100 per cent of the trees are so severely injured by frost that they will probably die. The bark on a high percentage of the trees, just above the snow line, is loosened from the wood from one-third to two-thirds of the circumference of the trunks. Even at the highest elevations it seems evident that fully 50 per cent of the trees are badly

damaged. It is my opinion that all of the trees, peach, in the section from 3 to 8 years old are killed or so badly injured that they will have to be pulled out.

"We made a very complete examination in the Purdue-Vincennes orchard and have concluded that the orchard has been completely wiped out. One hundred and sixty trees scattered through the rows where our spraying experiments were located last season were cut into and all of them appeared to be so severely injured that it does not seem possible that any of them will survive the effects of the freeze. Mr. Benson, the county agent, was in the P-V orchard with me this afternoon. After seeing the extent and severity of the injury he decided to send out immediately a circular letter to the peach growers advising them to investigate the frost damage in their orchards before incurring the expense of a dormant spray application."

February 7

"Since writing you yesterday peach trees have been examined in several orchards in the Oaktown section. Practically 100 per cent of the trees in that locality show severe injury. Only one tree out of the comparatively large number examined had the appearance of being in a normal condition."

February 8

"I have almost reached the conclusion that the injury showing on the peach trees in the form of loosened bark was caused by freezes occurring November 30 and December 3, 1929. The inner bark, cambium and wood of such trees are so very much discolored that the injury has the appearance of having been present for a longer time than that which has elapsed since the freeze of January 18."

DAMAGE TO PEACH TREES IN INDIANA

Following the finding of winter injured areas in the peach orchards it was suggested that pruning be discontinued until the extent of the injury could be determined. Since that time many orchards are showing less and others more injury.

The most serious area of injury is found about three inches above the snow line. Tap the bark in this area and if it sounds dead and punky it has separated from the wood of the tree. If this condition runs entirely around the trunk below the crotch the tree has little chance of recovery. However, in the orchards around Vincennes instances of this severe type of injury are not frequent and many trees have no loose bark whatever. In addition the small loose bark may nearly heal up if the bark over this area is still of a greenish brown color. The bark on the less injured area of the same trees usually is fairly tight to the tree and of various shades of brownish green. The wood of the tree may be of a blackish brown and still the tree has a good chance to recover if handled properly.

In the Oaktown section the injury is much more severe than in the orchards I visited around Vincennes. This is especially true of trees four to six years of age. Old trees have every indication of coming through the test with a complete loss of very few trees. Four to six year old trees around Oaktown should

be given no pruning until the trees come into leaf. At that time all dead wood can be removed and if they indicate sufficient vigor some heading back would be wise. The more vigorous the growth indications the heavier the tree can be cut back with safety. (C. L. Burkholder, Purdue Horticultural Department, Feb. 25).

WINTER INJURY TO PEACH AND APPLE TREES IN INDIANA

(From mimeographed extension memorandum, Purdue University)

Winter injury to peach and apple trees has occurred in Indiana as a result of the severe winter temperatures. There is considerable variation in the severity of the damage on both fruits. The injury to peach trees varies from discoloration of the bark and wood to complete separation of the bark from the wood. In the case of apple trees, the bark may be slightly discolored on the southwest side of the trunk or in severe cases cracked lengthwise of the trunk.

It is impossible to determine the severity of the injury to peaches at the present time. Injured trees should not be pruned until a couple of weeks after growth begins. Tests conducted by the Horticultural Department in 1918 showed that many trees recovered if left unpruned until after growth began. On the other hand many of the trees that were severely pruned or dehorned died. After growth has started the trees may be pruned. Very leggy trees may be headed back considerably (never dehorn). (See Purdue Bulletin No. 326, figure 8). Follow directions in this bulletin for pruning trees of other ages. If the tops are severely damaged as was the case in many trees following the 1918 freeze, it may be necessary to cut back more severely to small tufts of leaves on the main branches.

All peach trees should receive the dormant application for the control of scale and leaf curl. They have small chance of recovery if attacked by either scale or curl. Apply a readily available nitrogen fertilizer such as nitrate of soda or sulfate of ammonia to all injured peach trees as soon as growth starts. Use at the rate of 1/4 pound for each year in age of tree. Begin cultivation soon after growth begins.

Apple trees that have cracked should be bound tightly with a heavy wrapping twine of about half the size of your little finger. This will hold the bark tight against the wood and prevent drying. Seal the crack in the bark with melted paraffin or grafting wax. An excellent liquid wax can be prepared as follows: Melt together 5 pounds resin and 1-1/2 pounds bees wax. Add 3/4 pound lamp black stirring vigorously to prevent lumping. Next mix in 1/2 pint raw linseed oil. Apply this with a brush over the cracked area. (Monroe McCown)

WINTER INJURY TO PEACHES IN ILLINOIS

Members of the staff have examined trees from a number of different orchards in rather widely separated localities. I do not think it necessary to give details of each examination. I believe, however, that they are representative of the general condition. It can be safely said that there are no peach buds alive in the state. Out of several thousand peach buds examined in various localities and under a great variety of conditions, we did not find a single one which was alive.

The most alarming situation, however, is the condition of the trees themselves. Apparently, a great many young trees from 1 to 6 years old have been killed outright. This is especially true on low ground or in orchards which are planted at low altitudes. There was a marked difference between the temperatures in the low and the high areas in a given region. For example, at New Burnside, in Johnson County, in the heart of the peach growing region, the temperature was 21 degrees below. On a ridge 100 or so feet above New Burnside the temperature was only 12 degrees below in the orchard. The most serious injury is from the snow-line to the crotch on the trunk. In some cases the bark was split, but this is not usually true. In other words, externally the trees look all right. In cutting into the cambium, however, a dark brown area is found and in the worst cases the bark is loose. In older trees the cambium seems to be only slightly discolored, but the injury is in the wood of last year. In nearly all cases, in cutting across a twig, the xylem is brown. However, very little injury has been done in the cambium and the youngest layer of wood in the twigs. There has been very little actual killing back of twigs.

It will be rather difficult to estimate the chances of recovery of these trees. Judging from the past, the actual percentage of dead trees will not be so great but the weakening of the trees will be the most serious proposition.

In regard to the control of winter injury, we are advising the growers against dehorning, which seems to be a standard practice. We advise applications of nitrate and only moderately heavy pruning.

So far as I can learn, the condition which I have described is general over Missouri, southern Indiana, and northern Kentucky. (H. W. Anderson, Feb. 18)

WINTER INJURY TO PEACHES IN MICHIGAN

Although an extensive survey of the state of Michigan has not been made to determine the exact amount of injury caused by the sub-zero weather of January 18, it is believed that enough observations have been made to indicate the relative extent of the injury. The accompanying map gives the relative distribution of the injury in the state. In the shaded area, practically all of the fruit buds have been killed, severe injury to the twigs has resulted, and considerable black heart has developed. In the unshaded area between the heavy lines, the fruit buds have been killed to the extent of about 25 per cent to nearly 100 per cent in a few cases, depending upon the location of the orchard. Leaf buds and twigs in this area have been injured only moderately and in only a few cases has black heart developed. In the area north of the heavy lines, only very slight injury has occurred.

It should be noted that the severe injury has occurred in Berrien and Van Buren Counties which include more than one-half of the Michigan peach industry. The aggregated losses from this freeze will amount to more than $1,500,000 to the peach industry of this state. (H. H. Wedgworth)

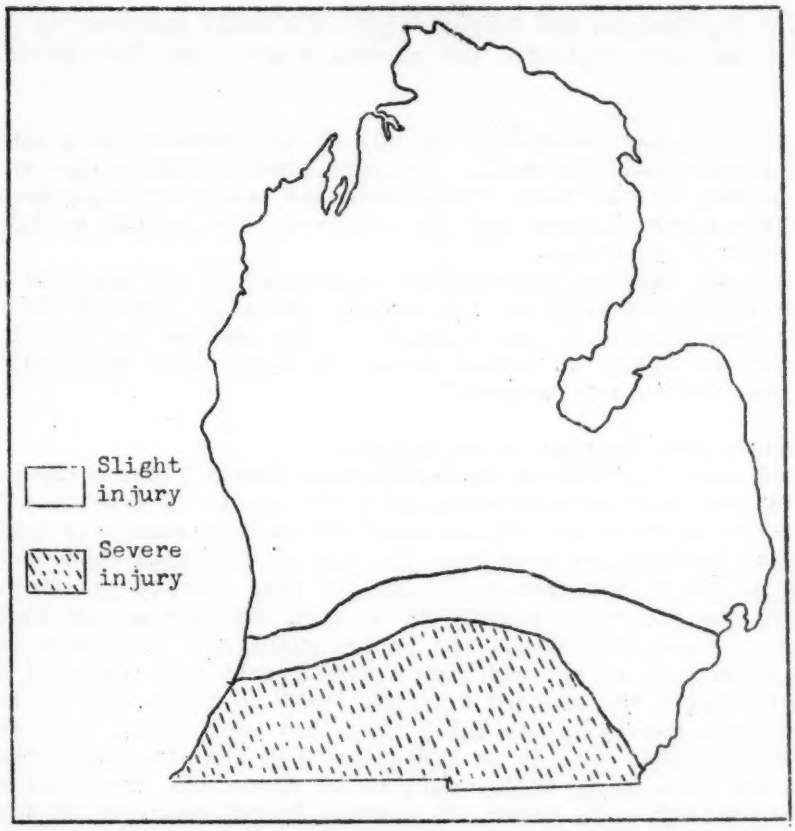

Figure 4. Areas in Lower Michigan where peach trees have been injured by low temperatures. (After map by H. H. Wedgworth)

FREEZING DAMAGE TO PEACH TREES IN ARKANSAS

Reports contained in letters from John C. Dunegan to John W. Roberts, Office of Horticultural Crops and Diseases.

On February 2, Mr. Dunegan collected twigs from an orchard at Springdale, Arkansas. Out of 1,123 buds examined the next day, only 5 were alive. Concerning this he writes:

> "These results are typical of the condition in the Elberta peaches in this section this season. After I finished examining the buds I sectioned the twigs on the sliding microtome to see if there were any signs of injury. The cambium in most of the 1929 twigs is very severely injured, as well as portions of the phloem, the xylem and the pith. Sections of older twigs showed that the injury was confined almost entirely to the pith and the pith rays where they extended through the xylem and there was hardly any indication of injury to the cambium. These twigs, of course, were collected in the Fayetteville section and I do not know the condition of the trees farther south so far as winter injury is concerned but the recent reports concerning the bud crop merely confirm the suggestions I wrote you last week, that the crop is practically wiped out."

On February 20, Dunegan and Cooper examined a small planting of young peach trees, which had been neglected for several years, near Springdale. Dunegan wrote:

"These trees were dead from the tip of the branches to a line about two inches above the soil. The same condition prevailed in another planting of old peach trees which had also been neglected. The young trees were Elberta and the old trees were mainly seedling trees and were of no value.

"On our way back to Fayetteville we stopped at the University Farm and examined the trees in the variety orchard. Many of these trees have been injured in the vicinity of the cambium but I do not know whether the injury is severe enough to cause their death although I rather look for this to happen."

Another report from Dunegan is as follows:

"On February 21, between Springdale and Lowell I saw a three-year old Elberta orchard consisting of 1,300 trees. I fear that the majority of these trees are killed outright as they show very decided injury in the cambium and wood from the tip of the twigs down to within an inch or two of the ground. I did not have time to go all over the planting but the owner assured me that he had done so and that the killing was the same throughout the entire planting. The trees had been well taken care of and had made a good growth last year. I will go back and examine the orchard a little later in the season to see if all the trees really do die but I feel that even though some may survive, the planting will be so irregular that from the commercial standpoint the best thing to do would be to remove the trees and set out another orchard. The owner, of course, is not going to do anything drastic until the advent of spring as he feels that there is a slight chance at least that some of the trees will recover."

APPLE AND PEACH INJURY AT HENDERSON, KENTUCKY

We examined peach trees in several orchards at Henderson, Kentucky, on Monday, February 10. The damage to trees in the higher ground appeared to be slightly less severe than in orchards occupying similar sites at Vincennes. In low ground, the damage appeared to be as great at Henderson as at Vincennes. Apple trees were also severely damaged in some of the orchards. (Leslie Pierce, February 19)

APPLE TREE INJURY IN INDIANA

Within the past ten days we have had a number of reports of severe winter injury to apple trees. The injury shows as a splitting of the bark from the snow line to the crotch. We have reports on several hundred trees that are affected in this way. (Leslie Pierce, February 26)

Apple trees which are cracking up and down the body should be wrapped spirally with heavy twine. The area over the crack should be closed with parafin or grafting wax. A good brush wax can be made as follows: 5# rosin, 1-1/2# beeswax, 1/2 pint linseed oil and 3/4# wood charcoal. Melt beeswax and rosin together, then add charcoal and stir mixture very rapidly to prevent lumping, add the linseed oil and mix it thoroughly with the others. The wax is ready for use to be applied hot with a brush. It will not crack badly or run in hot weather.

Any dead areas of bark which may appear in the crotches should be cut away to live tissue and painted. These trees should be taken care of as soon after the crack appears as possible. A good paint for all tree wounds can be made by mixing powdered bordeaux and raw linseed oil to the consistency of paint. This paint works best when mixed twenty-four hours before it is used. (C. L. Burkholder, February 25)

APPLE TREE INJURY IN ARKANSAS

February 21

"I visited a young apple orchard two miles south of Springdale yesterday, in company with Professor Cooper, and we found some very striking indications of injury as a result of the cold weather.

"The trees were six years old and had made a very vigorous growth for their age. A heavy crop of cow peas had been turned under each year and last spring an application of three pounds of nitrate of soda per tree was applied to the entire orchard. The orchard had been given intensive cultivation throughout the season and the soil at the present time shows no signs of clumps of grass between the rows or adjacent to the trees. We felt that the conditions were such that the trees had been over stimulated and did not enter the winter in the proper condition.

"The main injury was confined, as far as we could see at the present time, to a block of 100 trees of the variety Delicious. Every one of these trees was killed along the trunk, starting at a distance of about an inch or two above the ground and continuing upward to the main branches. The bark had cracked on the south side of practically every tree and could be liftad away from the trunk for almost the entire circumference. On some trees there was a narrow band about an inch or two inches wide on the north side that still adhered but not enough bark was left to carry a sufficient supply of nutriments to enable the tree to live. I took a number of pictures of this condition. (See plates 1 and 2)

"There were several other varieties in the planting but they were not injured to the extent of the Delicious, although all the trees had been given the same cultivation and fertilization. While the bark on the Stayman trees was not split open and loose, yet there was some browning of the tissues in the region of the cambium and we rather felt that a number of the trees would probably die during the coming season. The Jonathans were injured only slightly and we did not see any trees which we thought would die.

"There were a number of Ben Davis trees which had been cut back and top worked with Delicious. The trunks were Ben Davis and as far as we could find they were not injured at all. The soil condition, cultivation and other factors seemed to be uniform throughout the orchard and it presented a very interesting case of varietal differences in the amount of injury which occurred." (John C. Dunegan, February 21)

February 24

"I examined several orchards between Springdale and Lowell last Friday and found considerable variation in the amount of injury resulting from the low temperatures.

"Orchard No. 1 was a nine-year old apple orchard consisting of the varieties Jonathan, Ben Davis and Collins Red, of which the grower had attempted to make a "show" orchard and had pruned, fertilized, sprayed and cultivated it very extensively. The orchard was planted to cowpeas and in the summer they were plowed under and rye was sown. One-half of the planting is somewhat higher in elevation and very little evidence of injury was found in this portion of the orchard. In the other half, however, which is lower in elevation and not quite as well drained, a number of the trees showed a cracking of the bark on the south side. This injury was observed on all three varieties and while the bark was entirely loosened except for a narrow band on the north side in a few of the trees, in the majority the bark was loosened for only about one-third of the circumference. The injury, while it is similar to that which I described from the Delicious orchard in my last letter, was not as extensive. A number of the trees, of course, will probably die but I rather feel that some of those in which only a small area is loosened have some chance of recovery.

"Orchard No. 2 across the road from No. 1 was a planting of trees of the same age and of the same varieties. No. 2 had not been taken as good care of as had No. 1 and the orchard had not been cultivated as extensively. The cultivation, while it would be classed as late, was not as extensive nor continued to as late a date as that practiced in No. 1. No. 2 orchard was somewhat lower and not as well drained as the orchard across the road. I did not find any signs of cracking of the bark along the trunk and I examined a number of trees and found that while the crotch and trunk were in much better condition than the trees in the No. 1 orchard, yet the tops were rather severely damaged. The injury to the tops seemed to be on the main limbs. The bark and cortex was apparently uninjured, the cambium showed slight browning and the wood was quite brown in many of the limbs. (John C. Dunegan, February 24)

EXPLANATION OF PLATES

PLATE 1. Six-year old Delicious apple trees killed by low temperatures - Springdale, Arkansas. See text page 50. (Photo by J. C. Dunegan, February 20, 1930)

A. Bark cracked on south side of trunk.

B. Bark lifted away to show extent of injury.

PLATE 2.

A. Six-year old Delicious apple tree with loose bark removed to show extent and location of winter injury, Springdale, Arkansas. See text, page 50. (Photo by J. C. Dunegan, February 20, 1930)

B. Killed peach tree in Purdue - Vincennes Orchard, Vincennes, Indiana. The bark which was loosened by the freeze of January 18 has been removed to show the extent of the injury. (Photograph by Leslie Pierce, February 14, 1930)

PLATE 1.

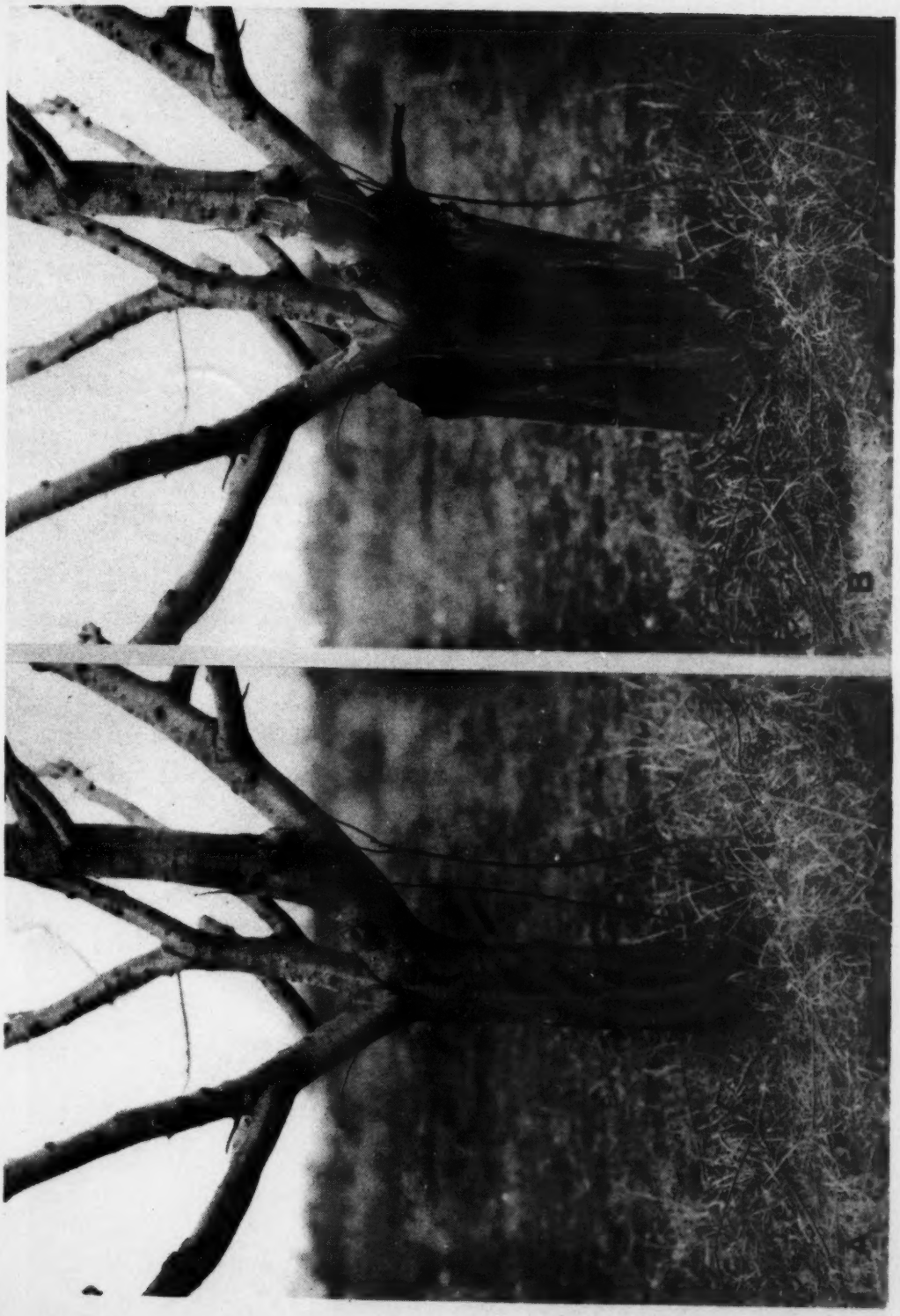

PLATE 2.

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